

Introductions, Invasions, & Exotic Species

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Terms

- **Introduction** – movement by humans of a species into an area where it was absent
 - Includes **reintroduction**
- **Exotic**- a species introduced into an area where it previously did not occur.
- **Endemic**- a species that naturally occurs only in one area.
- **Invasive species** – a species that tends to become abundant and expand into new areas

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Types of Introductions

- **Accidental**
 - as stowaways
 - Norway rat, zebra mussel, fire ants
 - escaped from captivity
 - gypsy moth, monk parakeet

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Types of Introductions

- **Intentional**
 - Reintroduction
 - Pets & ornamentals
 - House cats, mute swans
 - Establish a new wildlife population
 - Opossums in the west, ring-necked pheasants, wild pigs
 - Control other exotics
 - Mongooses on Hawaii & Caribbean, weasels in New Zealand

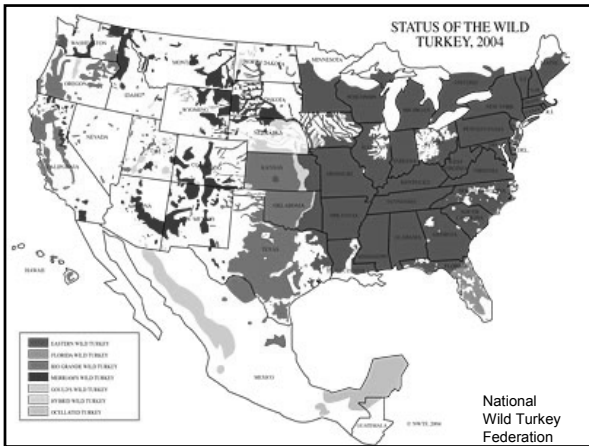
Reintroduction / Translocation

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Turkey Reintroduction

- Extirpated from much of native range by early 1900's
- Initial attempts to reintroduce failed
 - Released captive reared birds
- Trap & translocation of wild birds was much more effective

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Reintroduction / Translocation Concerns

- Diseases
 - Rabies was introduced to northeast with translocated raccoons
- Hard vs. Soft release
- Soft Release – hold in a pen at release site for a period of time before release
 - Acclimation & familiarity
 - Reduces “scattering”
 - Quarantine to check for diseases

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Steps to Increase Success of Species Introduction

- Ensure new habitat meets biological needs
 - Protection from predators often crucial
- Release as many animals as possible
- Use soft release
- For captive reared animals, ensure they retain natural feeding and escape behaviors
- Secure cooperation of landowners in the area

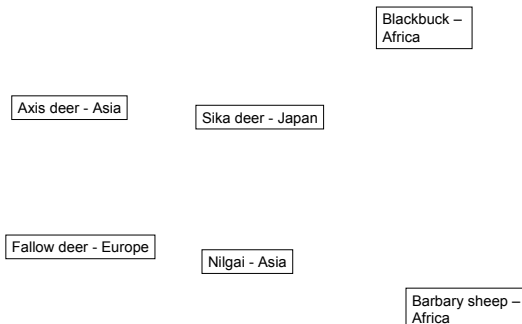
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Why Introduce Exotic Species?

- Exotic species can effectively fill “vacant niches”.
 - e.g. chukar partridge in Nevada
- Exotic species can replace native species that declined due to environmental change.
 - rainbow trout vs. brook trout
- \$\$
 - game ranching
- Control of other species
 - weasels introduced to New Zealand to control rabbits
- ??
 - Starlings were introduced because they were mentioned in Shakespeare

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Game Ranch Escapees in Texas



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Why Are Some Exotics So Successful?

- Absence of natural predators / diseases
 - gypsy moth
 - prickly pear cactus
- Absence of natural competitors, or stronger competitor than natives
 - starlings
- May be better at taking advantage of disturbance
 - Ringneck pheasant

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Problems with Exotics

- Hybridization -- may interbreed and swamp native species with introduced genes.
 - mallard and grey duck in Australia
- Predation
 - American mink eating water voles in Europe (may be extinct in England)
 - Stocked rainbow trout have devastated some amphibian populations
 - Peacock bass in Panama have caused extinction of at least 6 fish species

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Problems with Exotics (cont.)

- Competition
 - starlings and house sparrows vs. bluebirds and purple martins
- Exotic Diseases
 - Africa: cattle → rinderpest → cape buffalo & antelope
 - Britain: ringneck pheasant → nematode → gray partridge
 - Britain: gray squirrel → parapoxvirus → red squirrel

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Some Exotic Species in the U.S.

- European starling
- Rock dove (pigeon)
- House sparrow
- Ring-necked pheasant
- Chukar partridge
- Mute swan
- Feral pigs
- Brown trout
- Rainbow trout (in East)
- Nutria
- Bullfrog (in West)
- Opossums (in West)

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Case Study: Ringneck Pheasant

- Introduced to U.S. in 1800's
- Have spread throughout agriculture-dominated landscapes across northern U.S.
- Popular game bird
 - millions killed by hunters each year
 - millions of \$\$ spent each year
 - Millions artificially reared & stocked
 - State bird of South Dakota
- Best habitat = small farms with brushy edges & hedgerows
- Have outcompeted native prairie chickens

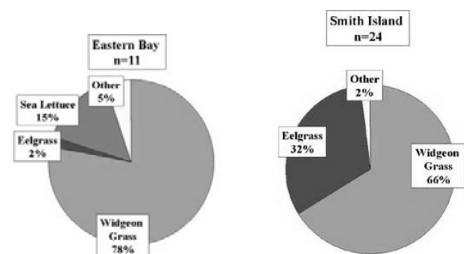
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Case Study: Mute Swan

- Introduced to U.S. in 1800's
 - ornamental
- Aggressive to people, pets, and other waterfowl
- Have spread across much of the northern U.S.
- In Chesapeake Bay, have contributed to decline in submerged aquatic vegetation and driven off native birds
 - Critical habitat for crabs & young fish

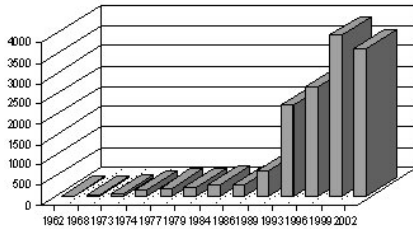
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Diets of mute swans from two sites on Chesapeake Bay
Patuxent Wildlife Research Center - 2001



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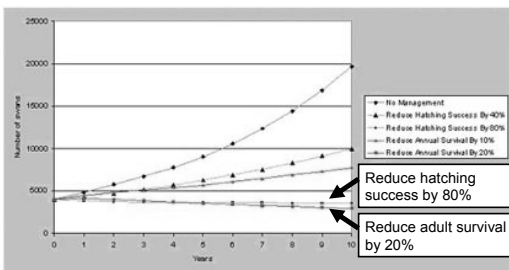
Estimated # Mute Swans in Maryland



Maryland Dept. of Natural Resources
<http://www.dnr.state.md.us/wildlife/msfinalfig1.html>

Management Options ?

Projected Population Growth Under No Management, Two Levels of Reduction in Hatching Success (40% and 80%) and Two Levels of Reduction in Adult Survival (10% and 20%)



Maryland Dept. of Natural Resources
<http://www.dnr.state.md.us/wildlife/msfinalfig3.html>

Case Study: Mute Swans

- August 2003: USFWS grants the state of Maryland a permit to cull swan population
- September 2003: Lawsuit → court injunction against cull
 - Claim: mute swans fall under the Migratory Bird Treaty Act (MBTA)
- 2004 – Migratory Bird Treaty Reform Act allows USFWS to specifically exclude mute swans (and other exotic species) from MBTA
 - Removes federal jurisdiction
- 2005-2006 – Maryland DNR culls about 2700 adult swans, initiates addling & oiling eggs
 - By 2007 population down to about 1500

New Zealand: “Exotic Wildlife Capital of the World”

- Cervids
 - American elk
 - Red deer
 - Whitetail deer
 - Sambar deer
 - Sika deer
- Chamois
- Himalayan tahr
- Wild boar
- Waterfowl
 - Mallard duck
 - Canada goose
 - Black swan
- Upland birds
 - Ringneck pheasant
 - California quail
 - Brown quail
 - Bobwhite quail
 - Chukar partridge
 - Wild turkey
- ≥22 other birds
- Game fish
 - Rainbow trout
 - Brown trout
 - Atlantic salmon
 - Chinook salmon
- House mouse
- Black & Norway rats
- Red fox
- European rabbit
- Weasel (stoat)
- Ferret
- Brushtail possum
- Hedgehog
- Domestic cat
- and so on...

Things to Remember

- Terms, modes of introduction/invasion
- Reasons why new species fail to establish
- Problems caused by exotics – examples
- Mute swan case study